CLAIMS

1. A process for producing a solid electrolyte thin film comprising the steps of:

(a) providing a plasma source coupled to a supply of plasma gas so as to emit a plasma stream that is directed to a substrate positioned adjacent the plasma source;

(b) vaporizing a volatile lithium containing precursor;

(c) vaporizing a volatile phosphate containing precursor:

(d) transporting the vaporized volatile lithium containing precursor to the plasma source;

(e) transporting the vaporized volatile phosphate containing precursor to the plasma source; and

(f) expelling the vaporized volatile lithium containing precursor and vaporized volatile phosphate containing precursor from the plasma source and into the plasma stream emitted from the plasma source,

whereby the volatile lithium containing precursor and volatile phosphate containing precursor are prevented from mixing with the plasma gas prior to the gas being expelled from the plasma source as a plasma stream.

2. The process of claim 1 wherein the volatile lithium containing precursor is selected from the group consisting of lithium tert-butoxide, lithium hexafluroisoproxide, and lithium tetramethylheptane dionate.

3. The process of claim 1 wherein the volatile phosphate containing precursor is selected from the group consisting of triethylphosphate and trimethyl phosphate.

4. The process of claim 3 wherein the volatile lithium containing precursor is selected from the group consisting of lithium tert-butoxide, lithium hexafluoroisoproxide, and lithium tetramethylheptanedionate.

5. The process of claim 1 wherein the plasma gas is non-reactive with the volatile lithium-containing precursor.

6. The process of claim 1 wherein the plasma gas is reactive with the volatile lithium containing precursor.

7. The process of claim 6 wherein the plasma gas is selected from the group consisting of hydrogen and oxygen.

8. The process of claim 1 wherein the volatile lithium containing precursor is vaporized in step (b) with a metal organic bubbler.

9. The process of claim 1 wherein the volatile phosphate containing precursor is vaporized in step (c) with a metal organic bubbler.

10. A process for producing a thin film electrolyte layer comprising the steps of:

(a) generating a plasma from a plasma gas;

(b) vaporizing a volatile lithium containing precursor;

(c) vaporizing a volatile phosphate containing precursor;

(d) directing the vaporized volatile lithium containing precursor into the generated plasma;

(e) directing the vaporized volatile phosphate containing precursor into the generated plasma; and

(f) directing the plasma mixed with the volatile lithium containing precursor and the volatile phosphate containing precursor onto a substrate,

whereby the volatile lithium containing precursor and volatile phosphate containing precursor are mixed into the plasma gas only after the plasma is generated.

11. The process of claim 10 wherein the volatile lithium containing precursor is selected from the group consisting of lithium tert-butoxide, lithium hexafluoroisoproxide, and lithium tetramethylheptanedionate.

12. The process of claim 10 wherein the volatile phosphate containing precursor is selected from the group consisting of triethylphosphate and trimethyl phosphate.

13. The process of claim 12 wherein the volatile lithium containing precursor is selected from the group consisting of lithium *tert*-butoxide, lithium hexafluroisoproxide, and lithium tetramethylheptane dionate.

14. The process of claim 10 wherein the plasma gas is non-reactive with the volatile lithium containing precursor.

15. The process of claim 10 wherein the plasma gas is reactive with the volatile lithium containing precursor.

16. The process of claim 15 wherein the plasma gas is selected from the group consisting of hydrogen and oxygen.

17. The process of claim 10 wherein the volatile lithium containing precursor is vaporized in step (b) with a metal organic bubbler.

18. The process of claim 10 wherein the volatile phosphate containing precursor is vaporized in step (c) with a metal organic bubbler.